



First record of the genus *Diplotaxis* Kirby, 1837 (Coleoptera, Scarabaeidae, Diplotaxini) in South America

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Abstract

The genus *Diplotaxis* Kirby, 1837 is composed of around 200 species reported from Canada to Panama. The species are most abundantly found in Mexico and the United States. This study reports for the first time the presence of *Diplotaxis poropyge* Bates, 1887 in Colombia. The individuals are from the departments of Atlántico and Bolívar in the Caribbean region of the country. With this discovery, we update the distribution of the genus to include South America.

Key words

Colombia, crop lands, Melolonthinae, new report, scarab beetle, Tropical dry forest.

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Introduction

Diplotaxis Kirby, 1837 is the second most diverse genus of the tribe Diplotaxini worldwide with 241 known species (Evans and Smith 2009, Delgado 2011, Delgado and Mora-Aguilar 2012). They occur from Canada to Panama and the West Indies (Vaurie 1958), and the major representation is in Mexico and the southwestern United States, with 183 and 108 species, respectively (Vaurie 1960).

In South America, there are no distribution records of *Diplotaxis* species, and the only members of Diplotaxini present in the north of South America are in the genus *Liogenys* Guérin-Méneville, 1831. According to Vaurie (1958), *Diplotaxis* and some species of *Liogenys* are very similar, and *Liogenys* are distinguished from *Diplotaxis* by the follow combination of characters: pygidium proportionately larger, also longer than wide; hind coxal plate at center extended farther posteriorly; sutural

interval of the elytra narrowed before the apex, the narrow part being somewhat elevated; the hind tibiae flatter, with a sharp, often carinate, not rather rounded inner edge, and the subapical callosity of the elytra situated farther from the margin and nearer the suture (Vaurie 1958). Otherwise, adults of *Diplotaxis* can be distinguished by their small or medium size (6–12 mm), black or tawny color, lack of striking sexual dimorphism, and by the follow combination of characters: absence of visible sutures between the propygidium and the fifth ventral segment, sixth ventral segment short, and in the small, rather round or elliptical, but not elongate or triangular pygidium that is entirely exposed by the elytra (Vaurie 1958).

The genus *Liogenys* is the equivalent of *Diplotaxis* in its widespread distribution for South America. In fact, the two genera complement each other geographically. While *Liogenys* is distributed from Panama to southern

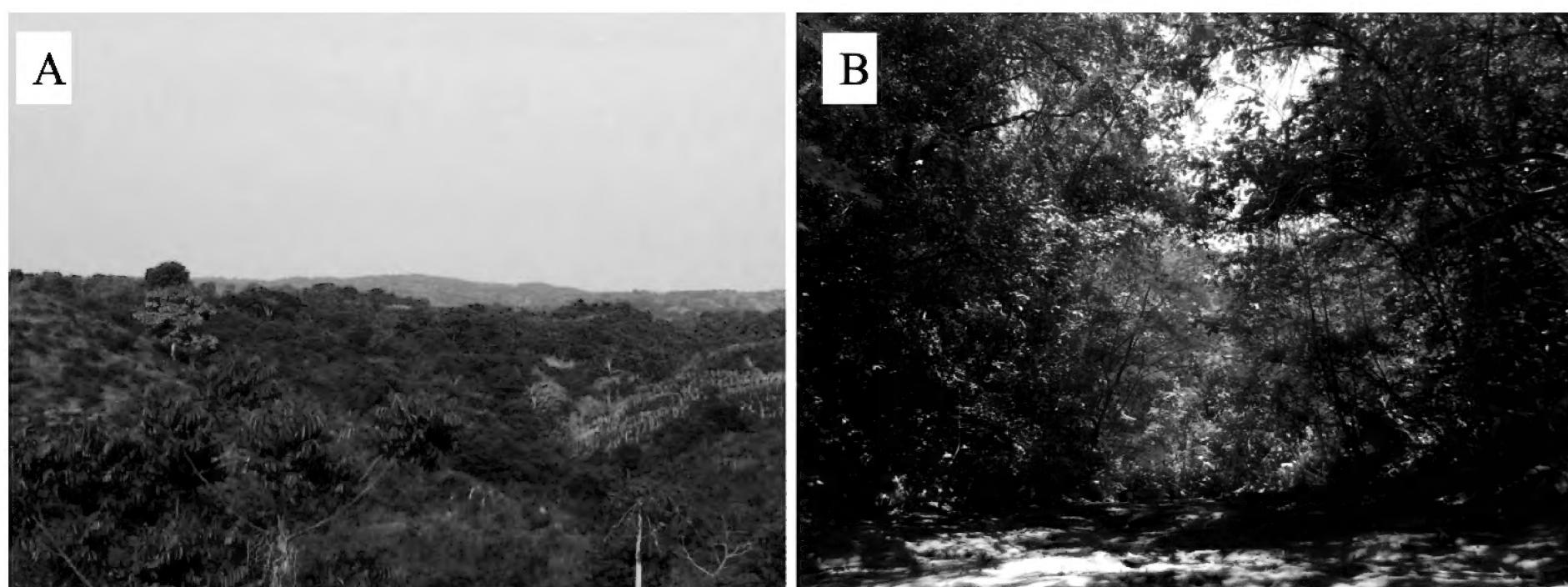


Figure 1. Habitats where *Diplotaxis poropyge* was collected. **A.** Reserva La Montaña, Usiacurí, Atlántico. **B.** Reserva La Flecha, San Jacinto, Bolívar.

Chile and Argentina (Cherman et al. 2017), *Diplotaxis* reaches the southern limits of its range in Panama with two species (*Diplotaxis poropyge* Bates, 1887 and *Diplotaxis zeteki* Vaurie, 1958) (Vaurie 1958).

Within the genus *Diplotaxis*, *D. poropyge* is the species with the widest distribution range. It is distributed from Mexico to the south of Panama (Vaurie 1958, 1960). The genus has never been reported from Colombia. However, the presence of *Liogenys quadridens* (Fabricius, 1798) in the Colombian Caribbean region is well documented (Restrepo-Giraldo et al. 2003, Pardo-Locarno et al. 2012, García-Atencia and Martínez-Hernández 2015, García-Atencia et al. 2015)

In this paper, we record the presence of the genus *Diplotaxis* in Colombia with new distribution records of *Diplotaxis poropyge* in the Colombian Caribbean region.

Methods

The individuals were collected in 2 localities of the Colombian Caribbean region: Reserva La Montaña (RLM) and Reserva La Flecha (RLF).

Reserva La Montaña (Fig. 1A) has an area of 47 ha of tropical dry forest and is located in the Usiacurí municipality, Atlántico department ($10^{\circ}46'02''$ N, $075^{\circ}02'34''$ W). The forest fragment has an approximate altitude of 220 m a.s.l., with average annual precipitation and temperature of 1161 mm and 27 °C, respectively (García-Atencia et al. 2015). The most common plants species include *Spondias mombin* L., *Crescentia cujete* L., *Pseudobombax septenatum* (Jacq.) Dugand, *Anacardium excelsum* L., *Parinari pachyphylla* Rusby, *Justicia bracteosa* (Milbr.) Leonard, *Malvaviscus arboreus* Dill. ex Cav., *Myrmecodendron costarricense* Britt. and Rose, *Petiveria alliacea* L., *Cordia alba* (Jacq.) Roem. & Schult, *Mangifera indica* L., *Guazuma ulmifolia* Lam., *Pereskia quisqueyana* (Ekman) Alain, *Bursera simaruba* (L.) Sarg., and *Hura crepitans* L. (García-Atencia et al. 2015).

Reserva La Flecha (Fig. 1B) is located in Palenquito, San Jacinto, Bolívar department ($09^{\circ}51'12''$ N, $075^{\circ}10'41''$

W). The area belongs to Montes de María subregion and correspond to tropical dry forest (Castaño-Uribe 1999). The forest has an extension of 149ha and an altitude between 350 and 510 m a.s.l. The average annual precipitation is 1972 mm and the average annual temperature of 25 °C (Castaño-Uribe 1999). The most predominant plant species are *Aspidosperma polyneuron* Müll.Arg., *Bursera simaruba* (L.) Sarg., *Hura crepitans* L., *Terminalia amazónica* (J.F. Gmel.) Exell, *Quadrella odoratissima* (Jacq.) Hutch., *Pseudobombax septenatum* (Jacq.) Dugand, *Uribia tamarindoides* Dugand and Romero, *Enterolobium cyclocarpum* (Jacq.) Griseb., and *Spondias mombin* Jacq.

Sampling was performed with white- and ultraviolet-light traps. The specimens were examined and identified by observation of external morphological structures and of the male genitalia. The taxonomic identification of the material was made with keys and descriptions proposed by Vaurie (1958). The specimens examined were deposited in the entomological collection of the Museo de Colecciones Biológicas Universidad del Atlántico Región Caribe (UARC), Barranquilla, Colombia.

The photograph of the specimens was taken using a Leica M125 stereomicroscope coupled to a Leica MC170 HD digital camera, using the software Leica Application Suite (LAS) version 4.6 and the construction of the final image was made with the software CombineZP v. 1.0.

The distribution map was prepared with Geographic Information System QGIS “Madeira” (v. 3.4.4, <https://qgis.org/es/site/>). Previous records of the distribution of the species were taken from Vaurie (1958) and Pacheco-Flores et al. (2008). Records without geographic coordinates were georeferenced to their locality using the geographic database GeoNames (<http://www.geonames.org/>).

Results

Diplotaxis poropyge Bates, 1887

Figure 2A–C

Synonym. *Diplotaxis subrugosa* Moser 1918: 297

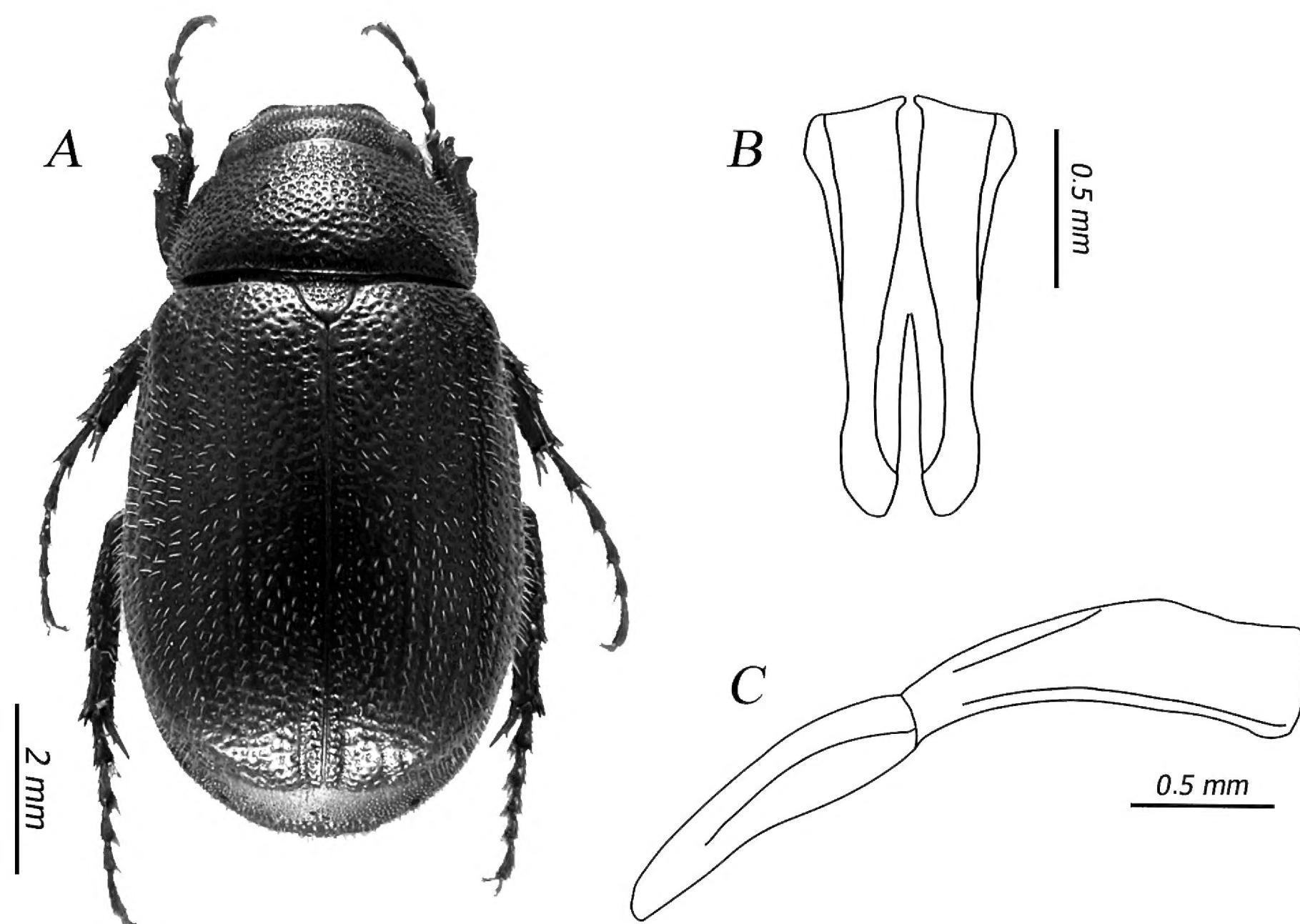


Figure 2. *Diplotaxis poropyge*. **A.** Habitus dorsal. **B.** Caudal view of parameres. **C.** Lateral view of parameres.

New country record. COLOMBIA • 414 specimens; Atlántico, Usiacurí, Reserva La Montaña; 10°46'02" N, 075°02'34" W; 220 m a.s.l.; 09–13 Mar. 2013; Sandy García-Atencia leg.; tropical dry forest; white- and UV-light traps; UARC-E 01L • 315 specimens; same collection data as for preceding; 08–11 Apr. 2013; cassava and corn cropland; UARC-E 02L • 220 specimens; Bolívar, San Jacinto, Reserva La Flecha; 09°51'9" N, 075°10'32" W; 324 m a.s.l.; 30 Apr. 2017; Iván Mendoza leg.; tropical dry forest; white- and UV-light traps; UARC-E 03L • 120 specimens; same collection data as for preceding; 16–19 Mar. 2018; UARC-E 04L • 98 specimens; same collection data as for preceding; 12–15 Jun. 2018; UARC-E 05L.

Identification. The specimens were identified using descriptions provided by Vaurie (1958). The determination of the species was reached with the help of the specialist Jhon César Neita from the Instituto de Investigación de Recursos Biológicos Alexander von Humboldt (IAvH, Boyacá, Colombia). The new specimens were compared with specimens deposited in the collection of the Instituto de Ecología, A.C. (INECOL, Xalapa, Mexico), with the help of the specialist Eder Mora-Aguilar.

The adults of *D. poropyge* were recognized by the following combination of characters: setae short, unequal in length on elytra, present in interval punctures of elytra, virtually absent from strial punctures, sometimes narrow intervals with longer hairs than broad intervals, abdomen with presence of chitinous ridge, occasionally

absent. Within the 8 species belong to the group *puberula*, *D. poropyge* is more closely linked to *D. puberula* LeConte, 1863, *D. subrugata* Moser, 1918, and *D. hirsuta* Vaurie, 1958 because they have a larger labrum and noticeably large mandibles, but *D. poropyge* differs from all species of the group in the absence of setae on the punctures of the elytral striae (Vaurie 1958).

Geographical distribution. *Diplotaxis poropyge* is known from Costa Rica, Guatemala, El Salvador, Honduras, Mexico, Nicaragua, and Panama. This is the first record of this genus and species from Colombia and from northern South America (Fig. 3).

Remarks. The *Diplotaxis* species exhibit nocturnal habits and these are easily attracted to light traps. Their food habits are phytophagous, and they are not considered such as pests of plants of economic importance.

The altitude found in both areas is similar to the altitudes recorded in other places where *D. poropyge* has been collected, such as the Mexican tropical dry forests (Vaurie 1958, Reyes-Novelo and Morón 2005, Pacheco-Flores et al. 2008).

Discussion

The genus *Diplotaxis* has been reported from Canada to the southern parts of Panama without records from Colombia. *Diplotaxis poropyge* has been recorded from

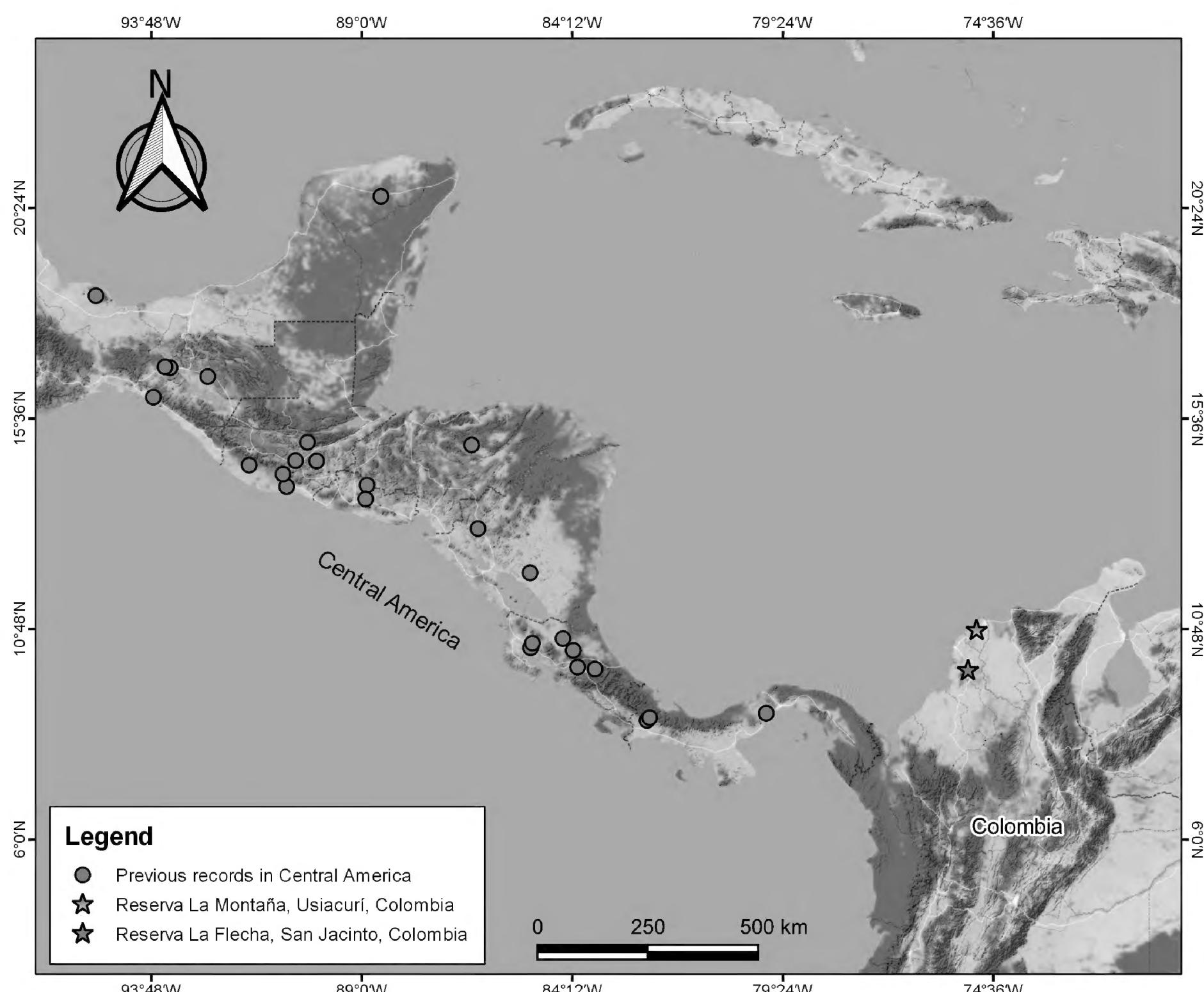


Figure 3. Map of known distribution of *Diplotaxis poropyge*. Blue circles are previous records. Stars are new records.

Central America and now, for the first time, from South America. However, the populations founded in tropical dry forest from RLM and RLF are numerous. The new records are based on 729 individuals captured in RLM and 438 individuals captured in RLF during rainy season.

According to García-Atencia and Martínez-Hernández (2015) and García-Atencia et al. (2015) in RLM, there are populations of *Liogenys quadridens* in crop lands and forest and they are in sympatry with *Diplotaxis*. These genera are very similar, but this sympatry represents an overlap on the periphery of their ranges (Vaurie 1958). According to Vaurie (1958), *Diplotaxis* and *Liogenys* evolved independently in North America and South America (respectively), and that sympatry probably is the result of secondary expansion. This suggests that the dispersion may be due to the reduction of environmental filters and the niche breadth in the limits of the distribution of species of these genera. On the other hand, is possibly that this sympatry has existed for a long time and the lack of sampling in the Colombian Caribbean region kept this sympatry hidden. Regardless, the distribution of *Diplotaxis* has been underestimated. Therefore, we report that the range of *D. poropyge*, the

most widely distributed species of the genus, reaches the tropical dry forest of the north of Colombia.

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Authors' Contributions

IAM collected the specimens, conducted processing of genital structures, produced the map, took the photographs and co-wrote the manuscript. SGA collected the specimens, drew the genitalia, and co-wrote the manuscript.

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